

Amendments to the Claims

This listing of claims, if entered, will replace all prior versions and listings of claims in the above-identified application.

Listing of Claims

1. (Currently Amended) A method of processing a packet **in a router** comprising:
creating a plurality of multi-feature packet processing rules, wherein
said creating comprises, for each multi-feature packet processing rule of
said multi-feature packet processing rules,
forming said each multi-feature packet processing rule by merging
a plurality of features **[[from]] according to** a feature
hierarchy,
each of said features is defined in said feature hierarchy, **[[and]]**
at least one of said features in said feature hierarchy comprise another of
said features in said feature hierarchy, **[[and]]**
said at least one of said features in said feature hierarchy is a complex
feature,
said another of said features in said feature hierarchy is a simple
feature, and
said at least one of said features in said feature hierarchy subsumes
said another of said features in said feature hierarchy;
populating said plurality of multi-feature packet processing rules in a multi-
feature classification memory; **[[and]]**
populating an associated content-addressable memory with a plurality of indices,
wherein
said indices are indices of said plurality of multi-feature packet processing
rules in said multi-feature classification memory,
said **associated** content-addressable memory and said multi-feature
classification memory are associated with one another by virtue of

said **associated** content-addressable memory being coupled to
provide an index of said indices to said multi-feature classification
memory, and

each of said indices corresponds to at least one of said multi-feature packet
processing rules;

**using said index to retrieve a multi-feature packet processing rule from said
multi-feature classification memory; and
processing said packet according to said multi-feature packet processing
rule.**

2. (Original) The method of claim 1, further comprising:

identifying a classification of said packet; and

using said classification to identify said multi-feature packet processing rule.

3. (Original) The method of claim 2, wherein said classification is based on
a plurality of parameters of said packet.

4. (Original) The method of claim 2, further comprising:

receiving said packet;

finding a match for said classification in said associated content-addressable
memory; and

receiving one of said indices from said associated content-addressable memory
for one of said multi-feature packet processing rules in said multi-feature
classification memory.

5. (Original) The method of claim 4, further comprising:

using said index to receive said multi-feature packet processing rule from said
multi-feature classification memory.

6. **(Currently Amended)** The method of claim 4, wherein said **associated**
content-addressable memory is a multi-feature content addressable memory.

7. (Currently Amended) The method of claim 4, wherein said **associated** content-addressable memory is a feature based content-addressable memory bank.

8. (Cancelled)

9. (Currently Amended) A method of processing a packet **in a router** comprising:

identifying a classification of said packet in a content-addressable memory;
causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification; and

locating a multi-feature packet processing rule in a multi-feature classification memory, wherein

said multi-feature packet processing rule is created by

forming said multi-feature packet processing rule by merging a plurality of features **[[from]] according to** a feature hierarchy,

each of said features is defined in said feature hierarchy,

at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy,

said at least one of said features in said feature hierarchy is a complex feature,

said another of said features in said feature hierarchy is a simple feature,

said at least one of said features in said feature hierarchy subsumes said another of said features in said feature hierarchy,

said locating uses said index, and

said content-addressable memory and said multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory.

10. (Original) The method of claim 9, further comprising:
processing said packet according to said multi-feature packet processing rule.
11. (Original) The method of claim 9, wherein said classification is based on
a plurality of parameters of said packet.
12. (Previously Presented) The method of claim 10, further comprising:
receiving said packet;
finding a match for said classification in said content-addressable memory; and
receiving said index from said content-addressable memory for said multi-feature
packet processing rule in said multi-feature classification memory.
13. (Original) The method of claim 12, further comprising:
using said index to receive said multi-feature packet processing rule from said
multi-feature classification memory.
14. (Original) The method of claim 12, wherein said content-addressable
memory is a multi-feature content addressable memory.
15. (Original) The method of claim 12, wherein said content-addressable
memory is a feature based content-addressable memory bank.
16. (Cancelled)
17. (**Currently Amended**) A packet processing rule lookup system for
processing a packet **in a router**, comprising:
a multi-feature classification memory, wherein
said multi-feature classification memory is configured to store a plurality
of multi-feature packet processing rules,
each of said multi-feature packet processing rules comprises a merged set
of features,

said merged set of features comprise a plurality of features ~~[[from]]~~ of a feature hierarchy,
each of said features is defined in said feature hierarchy,
each said merged set of features is formed by merging features of said set of features according to said feature hierarchy,
at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy,
said at least one of said features in said feature hierarchy is a complex feature,
said another of said features in said feature hierarchy is a simple feature,
said at least one of said features in said feature hierarchy subsumes said another of said features in said feature hierarchy, and
said each of said multi-feature packet processing rules is configured to allow said packet to be processed with regard to a set of said features corresponding to said each of said multi-feature packet processing rules; and
~~said each of said multi-feature packet processing rules is formed~~
a content-addressable memory coupled to said multi-feature classification memory, wherein
said content-addressable memory is configured to store a plurality of indices, and
each of said indices corresponds to at least one of said plurality of said multi-feature packet processing rules.

18. (Previously Presented) A network element comprising the packet processing rule lookup system of claim 17.

19. (Original) The network element of claim 18, further comprising:

a processor coupled to said multi-feature classification memory, said processor is configured to process a plurality of packets according to said plurality of packet processing rules.

20. (Original) The network element of claim 19, further comprising:
a network interface coupled to said processor, said network interface is configured to provide input output interface for said network element; and
a memory coupled to said processor, said memory is configured to store information.

21. (Original) The network element of claim 19, wherein said content-addressable memory is a multi-feature content addressable memory.

22. (Original) The network element of claim 19, wherein said content-addressable memory is a feature based content-addressable memory bank.

23. (Cancelled)

24. **(Currently Amended)** A network element comprising:
means for creating a plurality of multi-feature packet processing rules, wherein
said means for creating comprises, for each multi-feature packet
processing rule of said multi-feature packet processing rules,
means for forming said each multi-feature packet processing rule
by merging a plurality of features **[[from]] according to** a
feature hierarchy,
each of said features is defined in said feature hierarchy, **[[and]]**
at least one of said features in said feature hierarchy comprise another of
said features in said feature hierarchy,
**said at least one of said features in said feature hierarchy is a complex
feature,**
**said another of said features in said feature hierarchy is a simple
feature, and**

said at least one of said features in said feature hierarchy subsumes
said another of said features in said feature hierarchy, and
means for populating said plurality of multi-feature packet processing rules in a
multi-feature classification memory; **[[and]]**
means for populating an associated content-addressable memory with a plurality
of indices, wherein
said indices are indices of said plurality of multi-feature packet processing
rules in said multi-feature classification memory,
said **associated** content-addressable memory and said multi-feature
classification memory are associated with one another by virtue of
said **associated** content-addressable memory being coupled to
provide an index of said indices to said multi-feature classification
memory, and
each of said indices corresponds to at least one of said multi-feature packet
processing rules;
means for using said index to retrieve a multi-feature packet processing rule
from said multi-feature classification memory; and
means for processing said packet according to said multi-feature packet
processing rule.

25. (Original) The network element of claim 24, further comprising:
means for identifying a classification of said packet; and
means for using said classification to identify said multi-feature packet processing
rule.

26. (Original) The network element of claim 25, wherein said classification is
based on a plurality of parameters of said packet.

27. (Original) The network element of claim 25, further comprising:
means for receiving said packet;
means for finding a match for said classification in said associated content-
addressable memory; and

means for receiving one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory.

28. (Original) The network element of claim 27, further comprising:
means for using said index to receive said multi-feature packet processing rule from said multi-feature classification memory.

29. (**Currently Amended**) The network element of claim 27, wherein said **associated** content-addressable memory is a multi-feature content addressable memory.

30. (**Currently Amended**) The network element of claim 27, wherein said **associated** content-addressable memory is a feature based content-addressable memory bank.

31. (Cancelled)

32. (**Currently Amended**) A network element comprising:
a content-addressable memory;
means for identifying a classification of said packet in said content-addressable memory;
means for causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification; and
means for locating a multi-feature packet processing rule in a multi-feature classification memory, wherein
said means for locating comprises a means for forming said multi-feature packet processing rule,
said means for forming comprises means for merging a plurality of features **[[from]] according to** a feature hierarchy,
each of said features is defined in said feature hierarchy,

at least one of said features in said feature hierarchy comprise another of
said features in said feature hierarchy,

**said at least one of said features in said feature hierarchy is a complex
feature,**

**said another of said features in said feature hierarchy is a simple
feature,**

**said at least one of said features in said feature hierarchy subsumes
said another of said features in said feature hierarchy,**

said means for locating is configured to use said index, and
said content-addressable memory and said multi-feature classification
memory are coupled to one another by virtue of said content-
addressable memory being coupled to provide said index to said
multi-feature classification memory.

33. (Original) The network element of claim 32, further comprising:
means for processing said packet according to said multi-feature packet
processing rule.
34. (Original) The network element of claim 32, wherein said classification is
based on a plurality of parameters of said packet.
35. (Previously Presented) The network element of claim 33, further
comprising:
means for receiving said packet;
means for finding a match for said classification in said content-addressable
memory; and
means for receiving said index from said content-addressable memory for said
multi-feature packet processing rule in said multi-feature classification
memory.
36. (Original) The network element of claim 35, further comprising:

means for using said index to receive said multi-feature packet processing rule from said multi-feature classification memory.

37. (Original) The network element of claim 35, wherein said content-addressable memory is a multi-feature content addressable memory.

38. (Original) The network element of claim 35, wherein said content-addressable memory is a feature based content-addressable memory bank.

39. (Cancelled)

40. **(Currently Amended)** A computer program product comprising:
a set of instructions executable on a computer system, wherein
said computer program product is configured to process a packet by virtue
of said program product comprising said set of instructions, and
said set of instructions is configured to
create a plurality of multi-feature packet processing rules, wherein
said set of instructions configured to create comprises a
subset of instructions configured to, for each multi-
feature packet processing rule of said multi-feature
packet processing rules,
form said each multi-feature packet processing rule
by merging a plurality of features **[[from]]**
according to a feature hierarchy,
each of said features is defined in said feature hierarchy,
[[and]]
at least one of said features in said feature hierarchy
comprise another of said features in said feature
hierarchy, **[[and]]**
said at least one of said features in said feature
hierarchy is a complex feature,

**said another of said features in said feature hierarchy is
a simple feature, and
said at least one of said features in said feature
hierarchy subsumes said another of said features
in said feature hierarchy,**

populate a plurality of multi-feature packet processing rules in a
multi-feature classification memory, and

populate an associated content-addressable memory with a
plurality of indices, wherein

said indices are indices of said plurality of multi-feature
packet processing rules in said multi-feature
classification memory,

said **associated** content-addressable memory and said
multi-feature classification memory are associated
with one another by virtue of said **associated**
content-addressable memory being coupled to
provide an index of said indices to said multi-
feature classification memory, and

each of said indices corresponds to at least one of said
multi-feature packet processing rules,

**using said index to retrieve a multi-feature packet processing
rule from said multi-feature classification memory, and
processing said packet according to said multi-feature packet
processing rule;** and

computer readable storage media, wherein said computer program product is
encoded in said computer readable storage media.

41. (Original) The computer program product of claim 40, wherein said set of
instructions is further configured to:

identify a classification of said packet; and

use said classification to identify said multi-feature packet processing rule.

42. (Original) The computer program product of claim 41, wherein said classification is based on a plurality of parameters of said packet.

43. (Original) The computer program product of claim 41, wherein said set of instructions is further configured to:

receive said packet;

find a match for said classification in said associated content-addressable memory; and

receive one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory.

44. (Original) The computer program product of claim 43, wherein said set of instructions is further configured to:

use said index to receive said multi-feature packet processing rule from said multi-feature classification memory.

45. (**Currently Amended**) The computer program product of claim 43, wherein said associated content-addressable memory is a multi-feature content addressable memory.

46. (**Currently Amended**) The computer program product of claim 43, wherein said associated content-addressable memory is a feature based content-addressable memory bank.

47. (Cancelled)

48. (**Currently Amended**) A computer program product comprising:
a set of instructions executable on a computer system, wherein
said computer system comprises a content addressable memory,
said computer program product is configured to process a packet by virtue
of said program product comprising said set of instructions, and

said set of instructions is configured to

- identify a classification of said packet in said content-addressable memory,
- causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification, and
- locate a multi-feature packet processing rule in a multi-feature classification memory, wherein
- said multi-feature packet processing rule is created by
 - forming said multi-feature packet processing rule by
 - merging a plurality of features **[[from]]**
 - according to** a feature hierarchy,
- each of said features is defined in said feature hierarchy,
- at least one of said features in said feature hierarchy
 - comprise another of said features in said feature hierarchy,

said at least one of said features in said feature hierarchy is a complex feature,

said another of said features in said feature hierarchy is a simple feature,

said at least one of said features in said feature hierarchy subsumes said another of said features in said feature hierarchy,

said locating uses said index, and

said content-addressable memory and said multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory; and

computer readable storage media, wherein said computer program product is encoded in said computer readable storage media.

49. (Original) The computer program product of claim 48, wherein said set of instructions is further configured to:

processing said packet according to said multi-feature packet processing rule.

50. (Original) The computer program product of claim 48, wherein said classification is based on a plurality of parameters of said packet.

51. (Previously Presented) The computer program product of claim 49, wherein said set of instructions is further configured to:

receive said packet;

find a match for said classification in said content-addressable memory; and

receive an index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory.

52. (Original) The computer program product of claim 51, wherein said set of instructions is further configured to:

use said index to receive said multi-feature packet processing rule from said multi-feature classification memory.

53. (Original) The computer program product of claim 51, wherein said content-addressable memory is a multi-feature content addressable memory.

54. (Original) The computer program product of claim 51, wherein said content-addressable memory is a feature based content-addressable memory bank.

55. (Cancelled)

56. (Previously Presented) The method of claim 1, further comprising:

retrieving a one of said plurality of indices stored in an entry of said associated content-addressable memory by accessing said entry of said associated content-addressable memory, wherein
said one of said plurality of indices is stored in said entry of said associated content-addressable memory; and
accessing a one of said plurality of multi-feature packet processing rules in said multi-feature classification memory using said one of said plurality of indices, wherein
said one of said plurality of indices corresponds to said one of said plurality of multi-feature packet processing rules.

57. (Previously Presented) The method of claim 9, wherein
said identifying generates an index, and
said locating uses said index to locate said multi-feature packet processing rule.

58. (**Currently Amended**) The network element of claim 18, wherein
said content-addressable memory is configured to provide a one of said plurality of indices to said multi-feature classification memory, in response to an entry of said ~~associated~~ content-addressable memory being accessed, wherein
said one of said plurality of indices is stored in said entry of said ~~associated~~ content-addressable memory, and
said multi-feature classification memory is configured to produce a one of said plurality of packet processing rules for said plurality of features, in response to receiving said one of said plurality of indices, wherein
said one of said plurality of packet processing rules for said plurality of features corresponds to said one of said plurality of indices.